REMARKS

Claims 1-20 were pending in the present application. Claims 1, 3, and 15 have been amended. Claims 5 and 9-11 have been canceled without prejudice. New claims 21-24 have been added. Support for new claims 21 and 22 may be found, *inter alia*, on page 46, line 4, to page 47, line 26. Support for new claims 23 and 24 may be found, *inter alia*, in original claims 2 and 3. No new matter has been added. Therefore, claims 1-4, 6-8, and 12-24 are now pending in the present application.

Claim Objections

Claims 1 and 15 are objected to because of informalities. The Patent Office asserts that the fact that claims 1 and 15 each require only performing a single step, while the final limitation requires that all steps are performed, is incompatible. Applicant disagrees. The claims were limited to performing at least one of the recited steps, but further required that all of the remaining steps be performed, possibly by someone else. In other words, the claims were originally addressed to one who would attempt to circumvent literal infringement of the claims by performing fewer than all of the steps, and inciting another person to perform the remaining steps.

For the sake of furthering the present case to allowance, claims 1 and 15 have been amended to satisfy the Patent Office. However, Applicant reserves the right to amend the claims to their original form and preserves the above arguments. Withdrawal of the objections is respectfully requested.

Claim Rejection Under 35 U.S.C. 112

Claim 9 is rejected under 35 U.S.C. 112 for failure to provide sufficient antecedent basis. Applicant disagrees. The limitation "a time..." does not require antecedent basis. Nevertheless, for the sake of furthering the present case to allowance, claim 9 has been canceled.

Claim 9 is also rejected under 35 U.S.C. 112, second paragraph, for omitting essential elements. The Patent Office asserts that claim 9 relates a time to a distance without mentioning speed. However, Applicant asserts that a time-distance relationship determines speed. In other words, speed is inherently included in claim 9, because of the cited time-distance relationship. Nevertheless, for the sake of furthering the present case to allowance, claim 9 has been canceled.

Claim Rejection Under 35 U.S.C. 101

Claims 1, 4, 6-10, and 15-20 are rejected under 35 U.S.C. 101 as being directed to non-statutory matter because the claimed invention does not provide a "tangible result." The Patent Office specifically asserts that claim 5 does provide a "tangible result." Therefore, claims 1 and 15 have been amended to provide a tangible result similar to that recited in canceled claim 5. Withdrawal of the rejections is respectfully requested.

Claim Rejection Under 35 U.S.C. 102 and 103

Claims 1-9 and 11-12 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Application Publication No. 20010033702 to Kawabata (hereinafter "Kawabata"). Claims 10, 13, and 14 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kawabata in view of U.S. Patent No. 5,754,226 to Yamada et al. (hereinafter "Yamada"). Claims 15-20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kawabata in view of U.S. Patent No. 5,577,181 to Givens et al. (hereinafter "Givens"). Applicant respectfully traverses these rejections for at least the following reasons.

Claim 1 recites ascertaining a pixel location in a first image for each of a plurality of identifiable image points. Claim 1 also recites determining a first region within said first pixel, said first region smaller than said first pixel, in which said first particular identifiable image point is located, based at least in part on the ascertained pixel locations of said plurality of identifiable image points in said first and second images. None of the cited references teaches, discloses, or suggests these features.

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Kawabata is addressed to aligning two images that may have become misaligned. By comparing areas A and B from files 500, 502 (Figs. 5 and 6 and Paragraphs [0052] to [0066]) and selecting a portion C that maximizes correlation between A and C, two misaligned images may be realigned. Kawabata does not disclose identifiable image points, such as (on a human face) edges of a mouth or eyes, nor does it teach, disclose, or suggest ascertaining a pixel location in a first image for each of a plurality of identifiable image points, as required by claim 1.

Further, Kawabata is incapable of increasing the resolution of an image. The ability to produce a "sub-pixel alignment" (Paragraph [0088] and Fig. 10) does not enable Kawabata to identify where, within a particular pixel, an identifiable image point is located. Thus, Kawabata does not teach, disclose, or suggest determining a first region within said first pixel, said first region smaller than said first pixel, in which said first particular identifiable image point is located, as required by claim 1.

Yamada is addressed to increasing resolution in an image by shifting images a fixed quantity, such as a half pixel, on an imaging device (such as a CCD). By measuring an image before the shift and measuring the image after the shift, a processor can then combine the two measurements to produce an image having a higher resolution than is possible using only the imaging device. For example, assume a CCD has a resolution of 3x3 pixels. By measuring an image four times, each measurement offset to the others by ½ pixel in either the vertical or horizontal direction, then the resulting four 3x3 images can be digitally combined (using a processor) to produce a single 6x6 (higher resolution) image. See, e.g., Figs. 2 and 3 and related description, which show how shifting an image by ½ pixel in four measurements can yield an image having a 4-times increased resolution. While Yamada does not limit image shifting to ½ pixel, it discloses only predetermined shift sizes, in fractions of one pixel.

Yamada does not disclose identifiable image points, such as (on a human face) edges of a mouth or eyes, nor does it teach, disclose, or suggest ascertaining a pixel location in a first image for each of a plurality of identifiable image points, as required by claim 1.

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Further, unlike the present invention, in which identifiable image points are used to increase resolution, Yamada relies on predetermined image shift sizes, in fractions of one pixel. Thus, Yamada does not teach, disclose, or suggest determining a first region within said first pixel, said first region smaller than said first pixel, in which said first particular identifiable image point is located, based at least in part on the ascertained pixel locations of said plurality of identifiable image points in said first and second images, as required by claim 1.

Givens discloses a method for autonomous determination of tie points when attempting to connect overlapping images, such as aerial photographs of a geographic surface. Givens discloses an ability to "refine... candidate tie point locations to decimal line and sample (sub-pixel) accuracy... by fitting a quadratic surface to a 3x3 window... and determining the surface fit maximum needed to refine the tie point integer location to sub-pixel accuracy." (Col. 9, lines 48-56.) A second estimate is calculated "based upon the assumption that autocorrelation values... diminish according to an exponential function...". (Col. 10, lines 47-54.) Assuming *arguendo* that a tie point is an identifiable image point, Givens succeeds in increasing the resolution of the tie point to "sub-pixel accuracy" by making two mathematical assumptions (quadratic surface shape and exponential decay) based on pixels directly surrounding the tie point, not on locations of other tie points. In fact, Givens can increase the resolution of a tie point even if there is only one! (Col. 8, lines 15-17.) Givens' method of increasing the resolution of the tie point is based on empirical assumptions that "generally" provide good results. (Col. 11, lines 8-12.) Unlike Givens' method, the present invention always increases resolution accurately, but requires ascertaining the pixel locations of at least two identifiable image points.

Therefore, Givens does not teach, disclose, or suggest determining a first region within said first pixel, said first region smaller than said first pixel, in which said first particular identifiable image point is located, based at least in part on the ascertained pixel locations of said plurality of identifiable image points in said first and second images, as required by claim 1.

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Therefore, claim 1, and all claims dependent therefrom, are believed to be patentable over the cited references. Withdrawal of the rejections is respectfully requested.

Claim 15 recites features that are comparable to features in claim 1, and are patentable over the cited references for similar reasons. Specifically, claim 15 recites ascertaining first pixel locations in said first image for a plurality of identifiable image points. Claim 15 also recites determining first ranges for location relationships among the plurality of identifiable image points based at least in part on the first pixel locations, and determining pixel region locations (that are smaller than the pixels) for said plurality of identifiable image points based at least in part on and consistent with said third ranges (which are based at least in part on the first ranges through steps d)-f)).

As discussed, neither Kawabata nor Yamada discloses identifiable image points, such as (on a human face) edges of a mouth or eyes, nor do they teach, disclose, or suggest ascertaining first pixel locations in said first image for a plurality of identifiable image points, as required by claim 15.

Further, none of the cited references discloses determining first ranges for location relationships among the plurality of identifiable image points based at least in part on the first pixel locations, and determining pixel region locations (that are smaller than the pixels) for said plurality of identifiable image points based at least in part on and consistent with said third ranges (which are based at least in part on the first ranges through steps d)-f)). Again, at best, Givens discloses increasing the resolution of the tie point to "sub-pixel accuracy" by making two mathematical assumptions (quadratic surface shape and exponential decay) based on pixels directly surrounding the tie point, not on location relationships with other tie points. However, claim 15 requires determining pixel region locations based at least in part and consistent with ranges for location relationships among the identifiable image points. Givens simply does not teach, disclose, or suggest this feature (nor do Kawabata or Yamada).

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Therefore, claim 15, and all claims dependent therefrom, are believed to be patentable over the cited references. Withdrawal of the rejections is respectfully requested.

Fees and Conclusion

Applicant believes that he has paid for 20 claims, including three independent claims. Because the present application now includes 20 pending claims, including two independent claims, Applicant believes that no fee is due herewith. Applicant respectfully requests notification if additional fees are due.

Applicant respectfully requests entrance of the present amendments and a Notice of Allowance. If the Examiner believes that a telephone conference will further prosecution of the present case, the Examiner is invited to contact Applicant at the number indicated below.

Respectfully submitted,

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